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Report

to the

CITY COUNCIL

on

Garbage Collection and Disposal

by the

Department of Public Works

1905

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November 10, 1905.

To the Honorable, the Committee on Finance.

GENTLEMEN: I have the honor to herewith report the result of the observations of Assistant Superintendent of Streets Fox and myself made during the trip to New York, Philadelphia and Pittsburgh to investigate the garbage problem, together with other matters pertaining to the same.

Very respectfully,

JOSEPH M. PATTERSON,

Commissioner of Public Works.

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Garbage Disposition.

DEPARTMENT OF PUBLIC WORKS.
COMMISSIONER'S OFFICE.

Those who have interested themselves in the problem of garbage disposal in Chicago are agreed on this proposition: The dumps must go. Dumps poison the air for miles around; and if ground made by dumping is dug up years afterwards it is found still putrid. Dumping is a barbarous anachronism for a twentieth century city.

There is also general agreement that garbage must be collected daily from all houses in the city. For while fresh swill, under twenty-four hours old, is comparatively inoffensive and harmless, stale swill which has been left to decay for two or more days quickly becomes unpleasant and dangerous to health. Especially is this true in hot weather.

Shall garbage collected be disposed of by reduction or incineration? Reduction consists in squeezing the liquid out of the garbage; skimming the grease from this liquid, and converting the dry residue of the material into fertilizer. About three per cent. of the liquid can be saved for grease, the remainder running off into some large body of water. But this liquid is perfectly sanitary and comparatively odorless because it has been cooked at a temperature of 313 degrees Fahrenheit for some twelve hours.

Incineration is simply burning. The advantage of this method is that such waste material as paper, wood, etc., is disposed of at the same time while under reduction it requires separate treatment.

Garbage, however, is difficult to burn, since over 80% of it is water. So much coal is used that the process is expensive while there are no by-products such as grease or tankage (fertilizer material) which being sold can reduce the cost of destruction.

Garbage can probably not be burned for under \$2.00 per ton, while it can be rendered for considerably under \$1.00 per ton, once the rendering plant is built.

Boston, Philadelphia, New York, Baltimore, Pittsburg and Cleveland render their garbage, while the instances of success in economical incineration are rare and not well proven.

On the whole, therefore, until the case for incineration is better established in this country it would seem that Chicago would do wiser to try reduction.

Shall the rendering be done by the municipality or a private corporation? There are many trade secrets in the rendering process of which the city is not yet master. The business is an exceedingly intricate one in its present stage of development. I, therefore, strongly advise that for the present the rendering be done by private enterprise.

But in the specifications for garbage disposal lately drawn up by the Finance Committee it was provided that the collection of garbage also be done by private contract. This, in my judgment, would be a great mistake.

New York collects its garbage and turns it over to the rendering concern; Philadelphia lets out both collection and reduction to a private concern (which is composed of the same people as the New York firm).

Now the requisite for success in rendering is proper separation. The swill proper (kitchen refuse) must be in a different receptacle from the ashes, and rubbish (paper, wood, cloth, cans, etc.). Ashes and rubbish ruin the rendering machinery very quickly. In New York the separation is far more perfect than in Philadelphia. This is not only from the testimony of the officials of the plant but also was evident from the most cursory observation.

In New York, by its contract, the city contracts to deliver to the rendering firm 95% pure garbage. The city uses its police to compel householders to separate their refuse. Police cause more impression on householders than employees of a garbage firm. So as a matter of fact New York delivers garbage to the rendering firm which contains less than 2% foreign matter. Collections are made daily with mathematical accuracy. There is never a complaint on this score. And

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under the present New York government there is no politics in garbage collection nor in street cleaning.

In Philadelphia, on the other hand, because the machinery of the city government is not used to enforce collection, collection is far less perfect. Frequently there is as much as from 20% to 25% foreign material in Philadelphia garbage.

The city enforces or has tried to enforce daily collection in the following way: Whenever a complaint is made by a householder the contract firm is fined \$5.00 without appeal, and the firm puts the \$5.00 against the driver.

In the old Philadelphia days this arrangement was unquestionably a fruitful field. Fines were imposed when the driver had not been derelict. He had no recourse. This method was used to discipline him when he had been delinquent at the primaries. One of the high officials and chief stockholders in the Philadelphia concern informed me that shortly after he had moved into a new house one of his drivers was fined on complaint of a householder. Investigation showed that the city's books showed complaint of non-collection had been made by the holder of the house into which the aforesaid rendering company official had moved. Of course the complaint was not *bona fide*. The driver was probably behind in his dues to the ward club.

Even the briefest reflection must convince the experienced that politics might be played more rigorously under such a system than would be possible under our civil service law at its present state of efficiency.

There is this further consideration. The city must either collect the garbage itself or supervise its collection. If the city is unable to collect its garbage properly, it is also unable to supervise its collection by contractors.

Contractors are in it for the money. They will, if they do their own collecting, spend much of their energy in preventing other collectors from getting the "richest" garbage (that coming from hotels and restaurants). This is the case in Philadelphia and Pittsburg. By the same token they will, if they conveniently can, omit the collection of the "poor" garbage which is not rich in grease. And especially will they try to evade making too many long hauls too often, which wear out horseflesh and eat up wages for the amount of refuse collected. It *pays* the garbage company not to collect from outlying districts oftener than possible.

With the city collecting, on the other hand, this motive would not enter in. The city would not be in the business for profit and would not, therefore, center its attention on the profitable short hauls of "rich" garbage, but would treat all alike.

Again, if the city lets out garbage collection by contract, there will remain for disposition ashes, rubbish and street dirt. Should the city abdicate these municipal functions also? If not it must go into the teaming business for itself; buy land where necessary; build stables in various parts of the city; buy horses, and hire drivers.

The past system of hiring leaky wagons and worn-out, half-dead horses from political favorites at the rate of \$4.50 per day has been a joke—and an expensive one to the city. It must be said in fairness, however, that no team owner would send a good horse into the dump where a cut from a piece of old glass or can will allow the poison from the decayed swill to enter the blood of the horse and kill him.

I, therefore, respectfully suggest that the city go into the teaming business and append estimates of cost from Assistant Superintendent of Streets Fox and William Hard.

(In explanation let me say that the system of farming out the teaming for the city produces as bad results in the Water and Sewer Departments as in the Street Department.)

Respectfully submitted.

JOSEPH M. PATTERSON,

Commissioner of Public Works.

Garbage Collection and Disposal for the City of Chicago.

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF STREETS.

Chicago, November 13, 1905.

Hon. Joseph M. Patterson, Commissioner of Public Works:

DEAR SIR: It is unnecessary to call attention to the fact that Chicago is behind the times in its methods both of collection and disposal of garbage. Nor will it be questioned that the comfort and health of the people demand immediate adoption of up-to-date and sanitary means of conducting this important work. If there should be anyone who thinks otherwise, he can be easily converted by watching from his alley the manner in which it is necessary to load his refuse on the city wagon; by following in the wake of a swill-soaked wooden wagon, particularly on a hot day; by observing the arrival of the wagon at the big clay pit dumps, surrounded by people living in some cases right at their edges; by witnessing the struggle of the horses in the mass of garbage, broken glass and tin cans in an effort to get their loads in position; by noting the laborious process of unloading with pick and fork, requiring from thirty to forty minutes; by experiencing the insufferable stench that must be endured by the people in the neighborhood; by realizing the immediate effect on their health and the danger for years to come from building over such a mass of corruption, in some cases 80 feet deep.

Such conditions in so large a city are probably without parallel.

A proper solution of the matter should be sought in regular and more frequent collections, in an equipment suited to the work and in a system of final disposal that is sanitary and without nuisance. Garbage (I mean by this term simply animal and vegetable matter) under twenty-four hours old is no more objectionable than when it comes as refuse food from the table or the kitchen. To avoid nuisance, then, it should be removed daily and as a convenience to the householder each house should be visited as near the same hour each day as possible.

With so frequent a service the amount of garbage from an average family would amount to about two and a half pounds per day. The quantity, then, each day from any one house could be easily dumped by the driver directly into his wagon, preventing the nuisance and litter incident to the present practice of first upsetting the can in the alley and then shoveling into the wagon.

The garbage should be collected in covered dump wagons, constructed of steel, rendering it easy to wash and disinfect them and keep them in a sanitary condition.

These wagons, it is proposed, will deliver the garbage to docks at the stub ends of streets, and it will there be unloaded into scows. The loading places are to be in sufficient number to make the average haul about one-third less than at present, and to reduce as far as possible the number of wagons hauling to any one dock. This, together with the ability to unload quickly, will prevent "tie-ups" at the docks and their attendant nuisances. After loading the scows are to be towed to the point of final disposal.

As to the method of final disposal. In American cities the disposition of garbage is now being effected in the following ways:

1.	Feeding to swine (method in 35 out of 160 cities over 25,000 pop.)			
2.	Dumping as filling	"	40	"
3.	Digging into the soil	"	15	"
4.	Dumping in large bodies of water,	"	1	"
5.	Reduction (extracting the grease)	"	20	"
6.	Incineration (burning)	"	35	"

Unless the material is to be removed entirely from the city, sanitary and other considerations will narrow the choice in a city the size of Chicago to the last two methods. Each of these methods has its strong advocates.

Reduction is merely the separation of garbage (animal and vegetable refuse) into grease, water, and a residue called tankage. The grease is used principally for making soap. The tankage is dried and converted into a filler for fertilizers.

The financial success of this process depends on the complete separation of the garbage from all other refuse and the presence of grease in paying quantities. To get this separation requires constant watchfulness and the maintenance of a regular detail of one hundred or more police to see that negligent or careless householders do not mix their refuse. This police expense is, of course, a proper charge against this process, but it is never so recognized.

Incineration (destruction by fire) of pure garbage unmixed with other refuse is seldom attempted, as it contains an average of 80 per cent. water; that is, to burn 100 pounds of pure garbage 80 pounds of water must first be evaporated. Mixed with rubbish (wood, paper, excelsior, etc.) and with the addition of coal, garbage is burned in thirty-five out of 160 American cities with over 25,000 population. These, however, are the smaller cities. None of the cities of the first class, except San Francisco, has attempted to incinerate its entire output of garbage. New York has six crematories in operation, in the outlying boroughs, but the garbage of Manhattan, Bronx and Brooklyn, the densely populated areas, is disposed of by reduction. With these exceptions, the largest cities have adopted the reduction system. The reason is apparent. There is more grease and richer grease in the garbage of a large city. Reduction pays, then, in the large cities and it doesn't in the small ones.

By incineration the city is saved expense of perfect separation, and it is undoubtedly the most sanitary, as it disposes completely and without repeated handling of all organic matter and any lurking disease germs.

The cost of the two processes is given in a recent report as follows: In five cities the cost of reduction ranged from 60c to \$1.80 per ton. The cost of incineration in eleven cities varied from 38c to \$2.00 a ton. Conditions, however, vary so greatly in the different cities that comparisons of costs are of uncertain value.

After all is said and done the fact remains that no American city approximating the size of Chicago is now disposing of all of its garbage by incineration. This is the strongest argument in favor of reduction.

It is my opinion that the two methods could be used to great advantage under the conditions existing here. More detailed information as to quantity and quality of the garbage will show that in the outlying wards the amount is much less in proportion to the population than elsewhere, and that the percentage of grease is too low to pay for extraction. Incinerators in these districts would dispose of the mixed refuse and save the expense of long hauls.

If the garbage is disposed of by reduction, as is probable, I would recommend that it be done by contract, with the privilege of taking it over at a specific time, as private concerns are, with one exception, now handling the reduction plants of the country, and it would not be wise for the city to undertake the work without at least observing for a time the operation of such a plant.

With the garbage disposed of, there now remains for consideration the ashes and rubbish. The ashes, if free from garbage, are acceptable and make an excellent filling material.

The rubbish consists of 40 per cent. of bottles, rubber, rags, etc., which are salable, and 60 per cent. which is combustible. If collected separately from the other refuse, it is possible an economical disposition can be made of it as fuel for the pumping stations.

The collection of garbage I would recommend should be done by the city direct, with its own teams, drivers, etc., operated from its own stables. It can be done cheaper, more efficiently and more satisfactorily than under a contract. Under one system there would be a trained body of drivers employed by the year, well equipped wagons, and first-class horses; under the other temporary drivers, leaky wagons and impossible horses. As the city can contract for but one year, there is the possibility that a new contract may be let each year, with a period of disorder until the new contractor has his work in hand.

Furthermore, the present method it is agreed is unsatisfactory. It is also conceded that this plan gives better service than was formerly obtained under the contract system. Why then take a step backward? Why not improve the present situation? This can be done, as it has been done in cities like Boston, New York, Providence, etc., by the city owning and operating its entire plant, with men who are protected in their places by civil service.

Some doubt has been expressed as to the ability or inclination of the Bureau to conduct this work in the best interests of the city. If this is a fact, what about the same management compelling a contractor to give efficient service? Isn't the possibility of political and other considerations entering into the question greater under the contract system than under the new plan?

As an illustration of the workings of politics in connection with contracts, the history of the New York garbage contract, and that of Philadelphia, is applicable. In 1895, under the administration of Col. Waring a five-year contract was let for the disposition of all garbage for \$89,000 per year. This contract expired August 31, 1901. The then Commissioner of Street Cleaning delayed until June, 1901, in advertising for bids for the care of the garbage for the succeeding five years. This short notice shut out all bidders except the company who had the contract. It bid \$225,000 per year and got the contract.

The Philadelphia contract method of collection of garbage is considered to be very good. The printed reports of the Bureau of Streets show that the contractor collected in the year 1904, 300,000 tons of garbage, and the contractors themselves admit that they got only about half the total output. This 300,000 tons is more garbage than the whole city of New York, with a population three times the size of Philadelphia and approximately three times the area, produces in one year. Furthermore, the contractor received in 1905 \$560,000 for the collection and disposal of the garbage. Under the new order of things in Philadelphia a contract has been let for 1906 for the same service for \$399,000.

Padded pay-rolls and excessive prices for supplies are the two greatest evils which can arise under city management. These, however, I think can be provided against by giving publicity to all operations of the Bureau in charge. Printed reports for any citizen who may desire them, should be made quarterly or oftener, detailing the number of men, horses, and wagons employed; quantity and cost of feed and other supplies for each stable; the quantity of refuse collected and cost for each ward; and so on for every item of quantity and cost. A summer and a winter schedule showing the streets and alleys covered by each wagon should be published, with the number of the wagon and the number of the driver on each such route.

With this information any one familiar with this class of work could easily check up the men, teams and supplies and determine whether or not the people were getting a fair deal, and, if not, publicly call attention to the fact. This would entail some labor, but it can be done. Under the contract system it is difficult for city officials with the best intentions to keep tab on teams and men employed. It is human nature to look out for number one. From my experience I believe the average city contractor to be more human than others in this respect. He will take advantage of every opportunity and it would be difficult to check him in a work employing two hundred teams scattered over an area of one hundred and ninety square miles.

In estimating the number of teams necessary to give a daily collection of garbage throughout the city I have prepared the attached table as a guide.

It will be noted at the foot of column five, first half of page, that the average haul at present to the dump is 3.2 miles, and, under the same column, second half of page, it will be seen that the length of haul under the new plan averages 1.3 miles. It will further be noted in the two columns numbered six that the average distance travelled at present, in picking up two loads per day, is .87 of a mile, and under the new plan, collecting only 20 per cent. of the material now being moved, a wagon must travel an average of 4.4 miles before picking up, in most cases, two loads, in others one load per day.

That is, the distance to the dump under the new system is reduced more than one-half. The quantity of material is reduced to one-fifth. The distance travelled, however, in picking up a load has been increased five times. Offsetting this, there will be two men to a wagon instead of one, as at present, which will enable a team to travel double the distance.

The whole question as to whether or not the number of teams I have estimated (215) can do the work depends entirely on the streets and alleys a wagon with two men, one to either side of the street or alley, can cover in a day. The distance to and from the dump has but little bearing on the matter. From experiments conducted under present methods I am convinced that the teams can make the average of 4.4 miles per day which I have calculated.

Below I give an estimate of (1) cost of equipment and (2) the cost of operation of the garbage service for one year: It will be observed that these figures are liberal.

EQUIPMENT.

430 Horses @ \$250.00.	\$107,500.	
215 Wagons @ \$300.00.	64,500.	
215 Sets of Harness @ \$40.00.	8,600.	
Docks.	30,000.	
	<u>\$210,600.</u>	\$210,600.

COST OF OPERATION.

Feed, care, shoeing, etc., 430 horses @ \$165.	\$ 70,950.	
Wages, 215 drivers @ \$720.00.	154,800.	
Wages, 215 helpers @ \$470.00.	101,050.	
Rent of stables.	10,000.	
1 Veterinary.	1,200.	
Repairs to wagons, etc.	6,000.	
Replacing stock (4% of 430 - 16 @ \$250).	4,000.	
Depreciation, horses and equipment, \$210,600 @ 10%.	21,060.	
Int. on investment (3½%).	7,371.	
	<u>\$376,431.</u>	
Cost of final disposal as per proposal American Reduction Co. .	\$200,000.	
Hire of scows and tugs.	30,000.	
	<u>\$606,431.</u>	\$606,431.
Total Cost of operation for one year.		
Total Cost of Equipment and Operation 1st year.		<u>\$817,031.</u>

The lowest of the bids recently opened was \$740,000 the first year. The cost to the city for the first year, as per estimate above, is \$817,031. Apparently then, the cost to the city for the first year would be \$77,031 in excess of the contract price. It is apparent only, however, for at the end of the first year the city would be in possession of a plant worth (depreciation having been allowed) \$210,600. In effect then there would be a saving to the city, by conducting the work itself, of \$33,569 per year.

Herewith please find table appended.

Yours respectfully,

RICHARD T. FOX,

Ass't Sup't of Streets.

WORK DONE IN COLLECTION OF ALL REFUSE AT PRESENT

ESTIMATED WORK TO BE DONE IN COLLECTION OF GARBAGE ONLY.

CITY OF CHICAGO - DEPARTMENT OF PUBLIC WORKS - BUREAU OF STREET CLEANING - REPORT ON THE COLLECTION AND REMOVAL OF GARBAGE ONLY.																		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Ward.	Population.	Streets and alleys covered in collecting all refuse.	Total refuse collected daily.	Number of teams employed.	Loads made per day.	Service rendered.	Average Distance to Dump.	Distance made per team per day getting load.	Distance made per team per day to and from Dump.	Total Distance per team per day.	Tons of garbage daily Estimated.	No. of teams required Estimated.	Loads to be made per day.	Service to be Rendered.	Distance to Dump.	Dist. to be made per team per day picking up load.	Distance made to and from dump.	Total distance per team per day.
		(miles)	(tons)				(miles)	(miles)	(miles)	(miles)					(miles)	(miles)	(miles)	(miles)
1	45,326	16	50	13	2	Daily	6 $\frac{1}{4}$	1.2	25	26.2	11	4	2	Daily	1	4	4	8.0
2	52,754	19	71	18	2	Tri-weekly	5	.52	20	20.52	13	4	2	"	1 $\frac{1}{4}$	4.7	5	9.7
3	52,590	13	67	18	2	"	4	.36	16	16.36	13	4	2	"	1 $\frac{1}{2}$	3.2	6	9.2
4	54,513	6	34	9	2	Bi-weekly	4	.20	16	16.20	14	3	2	"	$\frac{3}{4}$	2.0	3	5.0
5	59,120	30	30	9	2	"	4	.95	16	16.95	15	7	2	"	$\frac{3}{4}$	4.3	3	7.3
6	67,716	32	80	22	2	Tri-weekly	4 $\frac{1}{2}$	.72	18	18.72	17	7	2	"	1	4.6	4	8.6
7	72,008	48	65	19	2	Bi-weekly	3	.84	12	12.84	18	9	2	"	1	5.3	4	9.3
8	59,790	30	24	8	2	"	2	1.20	8	9.2	15	7	1	"	2	4.3	4	8.3
9	50,871	11	38	10	2	Tri-weekly	5	.55	20	20.55	12	3	2	"	$\frac{1}{2}$	3.6	2	5.6
10	56,277	11	34	10	2	Every 4 das.	4	.27	16	16.27	14	3	2	"	$\frac{1}{2}$	3.6	2	5.6
11	60,250	16	33	9	2	Every 5 das.	3 $\frac{1}{2}$	.35	14	14.35	15	5	2	"	$\frac{3}{4}$	3.2	3	6.2
12	73,691	28	26	8	2	Bi-weekly	3	1.16	12	13.16	19	6	2	"	1	4.6	4	8.6
13	61,751	25	52	12	2	"	3 $\frac{1}{2}$	.69	14	14.69	11	6	2	"	1 $\frac{1}{4}$	4.1	5	9.1
14	56,425	22	56	12	2	"	3 $\frac{1}{2}$	.60	14	14.60	14	6	2	"	1 $\frac{1}{2}$	3.6	6	9.6
15	57,571	28	42	12	2	1 $\frac{1}{2}$ per week	3	.57	12	12.57	14	6	2	"	1 $\frac{1}{2}$	4.6	6	10.6
16	68,437	19	39	12	2	Bi-weekly	2	.52	8	8.52	17	6	2	"	$\frac{3}{4}$	3.1	3	6.1
17	70,849	24	55	14	2	"	3 $\frac{1}{2}$	.57	14	14.57	18	7	2	"	$\frac{3}{4}$	3.4	3	6.4
18	37,913	23	39	11	2	Tri-weekly	3 $\frac{1}{2}$	1.00	14	15.00	10	4	2	"	$\frac{1}{2}$	2.7	2	4.7
19	55,895	17	56	16	2	"	5 $\frac{1}{2}$	.53	22	22.55	16	4	2	"	$\frac{3}{4}$	4.2	3	7.2
20	58,893	22	71	19	2	Bi-weekly	4 $\frac{1}{2}$	.38	18	18.38	15	5	2	"	2 $\frac{1}{2}$	4.4	10	14.4
21	55,746	18	79	18	2	Tri-weekly	3	.50	12	12.50	14	4	2	"	1	4.5	4	8.5
22	58,950	30	48	13	2	Bi-weekly	3 $\frac{1}{2}$	.78	14	14.78	15	6	2	"	$\frac{1}{2}$	5.0	2	7.0
23	52,476	24	47	12	2	Tri-weekly	2	1.00	8	9.00	13	6	2	"	1	4.0	4	8.0
24	54,312	25	40	11	2	"	$\frac{3}{4}$	1.13	3	4.13	14	6	2	"	$\frac{1}{2}$	4.1	2	6.1
25	71,104	61	75	21	2	Bi-weekly	3	.96	12	12.96	13	10	1	"	2 $\frac{1}{2}$	6.1	5	11.1
26	58,842	50	52	14	2	Weekly	3	.60	12	12.60	15	8	1	"	1 $\frac{1}{2}$	6.2	3	9.2
27	63,114	100	21	8	1 $\frac{1}{2}$	"	3	2.00	9	11.00	16	12	1	"	4	8.3	8	16.3
28	62,902	17	38	11	2	1 $\frac{1}{2}$ per week	2 $\frac{1}{2}$	.38	10	10.38	16	5	2	"	1	3.4	4	7.4
29	65,190	30	37	10	2	Tri-weekly	1 $\frac{1}{2}$	1.50	6	7.50	16	6	2	"	2	5.0	8	13.0
30	67,866	10	49	14	2	"	3	.35	12	12.35	14	4	2	"	$\frac{1}{2}$	2.5	2	4.5
31	61,857	28	45	11	2	Bi-weekly	2 $\frac{1}{2}$	.84	10	10.84	14	8	1	"	1 $\frac{1}{2}$	3.5	3	6.5
32	60,395	64	48	14	2	"	2	1.52	8	9.52	14	10	1	"	1 $\frac{1}{2}$	6.4	3	9.4
33	59,668	48	33	10	2	"	2	1.60	8	9.60	14	12	1	"	2	4.0	4	8.0
34	40,859	42	21	7	2	"	3	2.00	12	14.00	10	5	1	"	2	8.4	4	12.4
35	42,893	44	19	7	2	"	2 $\frac{1}{2}$	2.09	10	12.09	11	7	1	"	3 $\frac{1}{2}$	6.2	6	12.2
		1,031	1,614	442			35) 114	35) 30.45	35) 455		500	215			35) 46	35) 155.1	35) 144	
						Av. 35 wards	3.2	.87	13					Av. 35 wds	1.3	4.4	4.1	

Plan for New District Organization.

Chicago, November 10, 1905.

Hon. J. M. Patterson, Commissioner of Public Works:

DEAR SIR: I herewith submit an outline of a plan for a new district organization for the Department of Public Works, in accordance with your request.

It would immensely benefit the Department of Public Works if a consolidated system of district organization could be substituted for the present complicated system under which each of the subordinate bureaus maintains its own district organization without any reference to any other bureau.

The Bureau of Streets has its thirty-five ward headquarters.

The Bureau of Sewers has its four big cleaning districts and its two additional repair gangs.

The Bureau of Water Pipe Extension has its eight main districts and its three additional "mason's" districts.

Other bureaus have still other headquarters of their own.

Meanwhile the city has a certain amount of real estate which either is not being used at all or in other cases is not being used to its full capacity.

A proper study of the whole situation would probably make it possible for the Department to unite these conflicting districts into, say, eight, ten or twelve consolidated districts, each of which would represent in itself the many activities with which the Department is charged. The exact number and location of these districts is an important matter to be carefully worked out with reference to the geography of the city.

There are obvious advantages in having all the bureaus of the Department brought together at each district headquarters. Co-operation would then be convenient. In many matters it is necessary for two or more bureaus to work together in order to secure results. Rapidity of action could be acquired if these bureaus occupied the same premises.

It would not be necessary to give up the present ward headquarters in the Bureau of Streets. Two, three or four wards could be put together in a district. The ward would be a subdivision of the district.

If the Department ever acquires stables of its own for the purpose of doing its own teaming these stables would fit into the district scheme.

The horses of each of the bureaus would be kept in the Department stables and the consequence would be that each district would have its own equipment, both in men and in horses, for giving the Department a convenient and useful local organization.

With city stables it would also be possible for the Department to buy the coal for its pumping stations at switchtracks, that is, to have it delivered at switchtracks, and then haul it with city teams to the pumping stations. In this way it is probable that a considerable saving could be effected in the cost of coal.

The fundamental advantage, however, of an organization by districts, bringing as many as possible of the bureaus together in each district, would be that the present organization would be simplified, and that each district would represent a co-ordination of all the bureaus of the Department. The present wasteful method of overlapping jurisdictions and duplicated organizations would be abolished.

Tables of cost are appended.

Respectfully submitted.

WILLIAM HARD.

COST OF EQUIPMENT.

(a) BUREAU OF STREETS.

1345 Horses @ \$250.00.....	\$336,250.	
582 Garbage and Ash Wagons @ \$300.00.....	174,600.	
35 Single Wagons @ \$110.00.....	3,850.	
30 Steel Carts for 1st Ward @ \$110.....	3,300.	
66 Dirt and Cinder Wagons @ \$200.00.....	13,200.	
1345 Sets of Harness @ \$25.00.....	33,625.	\$564,825.

(b) BUREAU OF SEWERS.

4 Horses for Flushing Wagon @ \$250.00.....	\$1,000.	
4 Horses for Single Rigs @ \$175.00.....	700.	
48 Horses for Double Teams @ \$250.00.....	12,000.	
4 Single Wagons @ \$125.00.....	500.	
35 Running Gears @ \$65.00.....	2,275.	
4 Sets of Single Harness @ \$25.00.....	100.	
24 Double Sets of Harness @ \$40.00.....	960.	\$17,535.

(c) SHUT-OFF DEPARTMENT.

8 Horses at \$175.00.....	\$1,400.	
4 Buggies @ \$175.00.....	700.	
4 Single Wagons @ \$125.00.....	500.	
8 Sets Harness @ \$25.00.....	200.	\$2,800.

(d) METER MECHANICAL.

7 Horses @ \$175.00.....	\$1,225.	
7 Express Wagons @ \$125.00.....	875.	
7 Single Sets Harness @ \$25.00.....	175.	\$2,275.

(e) METER RATE.

8 Horses @ \$175.00.....	\$1,400.	
8 Buggies @ \$175.00.....	1,400.	
8 Sets Single Harness @ \$25.00.....	200.	\$3,000.

(f) ASSESSOR'S OFFICE.

12 Horses @ \$175.00.....	\$2,100.	
12 Sets of Single Harness @ \$25.00.....	300.	
6 Buggies @ \$175.00.....	1,050.	
6 Express Wagons @ \$125.00.....	750.	\$4,200.

(g) WATER PIPE EXTENSION.

18 Horses at \$175.00.....	\$3,150.	
8 Buggies @ \$175.00.....	1,400.	
10 Single Wagons @ \$125.00.....	1,250.	
18 Single Sets Harness @ \$25.00.....	450.	\$6,250.

14 Stables @ \$20,000 each.....	\$600,885.	
14 Building Sites.....	280,000.	
	70,000.	

Total Cost of Equipment for all Bureaus.....

\$950,885.

COST OF OPERATION.

BUREAU OF STREETS.

Feed, care, shoeing, etc., 1,345 Horses at \$165.00	\$221,925.	
Wages, 678 drivers @ \$720.00 per year	488,160.	
Wages, 215 helpers on garbage wagons @ \$470.00 per year	101,050.	
2 Veterinaries @ \$1,200.00 per year	2,400.	
Repairs to wagons, harness, etc.	15,000.	
Replacing stock (4% of 1,345-54 @ \$250.00)	13,500.	\$842,035.

BUREAU OF STREETS.

Depreciation Horses and Equipment, \$564,825 @ 10%	\$56,482.	
Depreciation, Stables, \$280,000 @ 5%	14,000.	
Interest on Investment, \$914,825 @ 3 1/2%	32,018.	
Sundries	10,000.	\$112,500.

BUREAU OF SEWERS, SHUT-OFF DEPT., METER MECHANICAL, METER RATE, ASSESSOR'S OFFICE AND WATER PIPE EXTENSION DIVISION.

Feed, care, shoeing, etc., 110 horses @ \$165.00	\$18,150.	
33 Drivers @ \$720.00	23,760.	
Repairs to Harness, Wagons, etc.	5,000.	
Depreciation on Horses and Equipment, \$36,060. @ 10%	3,606.	
Interest on Investment at 3 1/2%	1,262.	
Sundries	1,000.	\$52,778.

Total Cost of Operation, all Bureaus. \$1,007,313.

COST OF OPERATION UNDER PRESENT METHOD.

BUREAU OF STREETS.

Garbage teams, 131,162 days @ \$4.50	\$590,299.	
Dirt teams, 19,849 days @ \$4.50	89,320.	
Dirt carts, 5,545 days @ \$3.25	18,021.	
Single rigs, 5,936 days @ \$3.25	19,292.	
Cinder teams, 1,878 days @ \$4.50	8,451.	\$725,313.

BUREAU OF SEWERS, SHUT-OFF DEPT., METER MECHANICAL, METER RATE, ASSESSOR'S OFFICE AND WATER PIPE EXTENSION.

49 Single Wagons @ \$3.25 per day	\$49,913.	
24 Double Wagons @ \$4.50 per day	33,804.	
1 Wagon (4 horses) @ \$7.00 per day	2,191.	
8 Wagons (1 horse) @ \$18.00 per month	1,728.	\$87,646.

Total Cost per Year of all Bureaus (present method) \$812,959.

COMPARISON OF COST OF OPERATION UNDER NEW METHOD AND PRESENT METHOD.

Total Cost of New Method	\$1,007,313.
Deduct by reason of increase in expense of daily garbage collection	252,062.
	\$755,251.
Total Cost per year of Present Method	812,959.
Saving to the City in operating its own plant per year	\$57,708.

Respectfully submitted.

WILLIAM HARD.

Addendum.

*A matter not properly a part of the garbage question came under our notice during our trip; namely, the inoffensive way in which rendering is done in New York. The New York method suggested to us that the same precautions might greatly diminish the odors made by the stock yards rendering plants. While we did not go into the scheme at all deeply yet we did learn enough to convince ourselves that the appointment of a competent sanitary engineer and the following of his advice by the stock yards companies would do much to mitigate the stench arising from stock yards districts.

I most respectfully apologize for trespassing on a matter not within my province.

All the foregoing is respectfully submitted.

JOSEPH M. PATTERSON,

Commissioner of Public Works.